

CLAIMS

What is claimed is:

- 1 1. A molding machine, comprising:
 - 2 a mold, including an upper mold plate and a lower mold plate, said upper mold plate
 - 3 and having a first plurality of cavities therein and said lower mold plate and having a second
 - 4 plurality of cavities therein, said first and second pluralities of cavities cooperating to form a
 - 5 plurality of mold volumes when said first and second mold plates are aligned and abutted;
 - 6 an upper heat transfer platen coupled to said upper mold plate, said upper heat transfer
 - 7 platen having a first series of channels and a second series of channels, said first series of
 - 8 channels being separate from said second series of channels, wherein said first and second
 - 9 series of channels are substantially coplanar within said upper heat transfer platen; and
 - 10 a lower heat transfer platen coupled to said lower mold plate, said lower heat transfer
 - 11 platen having a third series of channels and a fourth series of channels, said third series of
 - 12 channels being separate from said fourth series of channels, wherein said third and fourth
 - 13 series of channels are substantially coplanar within said lower heat transfer platen.

1 2. The molding machine of claim 1, wherein:

2 said first series of channels includes a first feeder channel and a second feeder channel
3 running along opposing edges of said upper heat transfer platen and a first plurality of
4 transverse channels connecting said first and second feeder channels;

5 said second series of channels includes a third feeder channel and a fourth feeder
6 channel running along opposing edges of said upper heat transfer platen and a second plurality
7 of transverse channels connecting said third and fourth feeder channels;

8 said third series of channels includes a fifth feeder channel and a sixth feeder channel
9 running along opposing edges of said lower heat transfer platen and a third plurality of
10 transverse channels connecting said fifth and sixth feeder channels; and

11 said fourth series of channels includes a seventh feeder channel and an eighth feeder
12 channel running along opposing edges of said lower heat transfer platen and a fourth plurality
13 of transverse channels connecting said seventh and eighth feeder channels.

1 3. The molding machine of claim 2, wherein said first and second series of channels are
2 disposed within an adapter in communication with the upper heat transfer platen.

1 4. The molding machine of claim 3, wherein:

2 said adapter comprises a first and second orifice;

3 said first orifice provides fluid communication from a first source of a first heat

4 transfer medium to said first series of channels;

5 said second orifice provides fluid communication from a second heat transfer medium

6 to said second series of channels; and

7 said adapter is capable of independently supplying said first and second heat transfer

8 media to the first and second series of channels.

1 5. The molding machine of claim 4, wherein said two heat transfer media are selected

2 from a group consisting of steam, electrical heaters, water, oil, air, and the like.

1 6. The molding machine of claim 4, wherein said two heat transfer media include a

2 medium to add heat and a medium to remove heat.

1 7. The molding machine of claim 2, wherein:

2 said first and second pluralities of transverse channels are vertically offset by a

3 maximum of about one times a diameter of said first plurality of transverse channels; and

4 said third and fourth pluralities of transverse channels are vertically offset by a

5 maximum of about one times a diameter of said third plurality of transverse channels.

1 8. The molding machine of claim 2, wherein:

2 said first and second pluralities of transverse channels are substantially coplanar; and

3 said third and fourth pluralities of transverse channels are substantially coplanar.

1 9. The molding machine of claim 2, wherein:

2 said first plurality of transverse channels are relatively substantially parallel, said
3 second plurality of transverse channels are relatively substantially parallel, and said first
4 plurality of transverse channels are substantially parallel to said second plurality of transverse
5 channels; and

6 said third plurality of transverse channels are relatively substantially parallel, said
7 fourth plurality of transverse channels are relatively substantially parallel, and said third
8 plurality of transverse channels are substantially parallel to said fourth plurality of transverse
9 channels.

1 10. The molding machine of claim 1, further comprising a ram coupled to said lower heat
2 transfer platen.

1 11. The molding machine of claim 10, further comprising a plurality of thermal insulation
2 plates.

1 12. The molding machine of claim 11, wherein at least a portion of said thermal insulation
2 plates are intermediate said ram and said lower heat transfer platen.

1 13. The molding machine of claim 10, further comprising a control system for controlling
2 movement of said ram.

1 14. The molding machine of claim 1, further comprising a mold protection device for
2 monitoring the operation of the molding machine.

1 15. The molding machine of claim 14, wherein said protection device includes a linear
2 measurement device.

1 16. The molding machine of claim 14, wherein said protection device includes a pressure
2 measurement device.

1 17. The molding machine of claim 14, wherein said protection device includes a linear
2 measurement device and a pressure measurement device.

1 18. A compression molding machine, comprising:
2 a movable ram;
3 a static head; and
4 a protection system.

1 19. The molding machine of claim 18, wherein said protection system includes:
2 a linear measurement device for measuring a position of said ram;
3 a pressure measurement device for measuring a pressure exerted by said ram; and
4 a controller coupled to said linear measurement device and pressure measurement
5 device.

1 20. The molding machine of claim 19, wherein said controller contains a plurality of
2 programmable triggers to ensure the molding machine is operated in a safe manner.

1 21. The molding machine of claim 20, wherein engagement of one of said variable triggers
2 disengages said ram.

1 22. The molding machine of claim 20, wherein said plurality of triggers are based on
2 measurements from said linear measurement device or said pressure measurement device.

1 23. The molding machine of claim 20, wherein said plurality of triggers are based on
2 measurements from said linear measurement device and said pressure measurement device.

1 24. The molding machine of claim 20, wherein said controller contains a variable trigger
2 for transitioning between a first ram speed and a second ram speed, said first ram speed being
3 faster than said second ram speed.

1 25. The molding machine of claim 20, wherein said controller contains a variable trigger
2 for disengaging said ram if a measurement from said pressure measurement device exceeds a
3 predetermined value.

1 26. The molding machine of claim 20, wherein said controller contains a variable trigger
2 for transitioning between a relatively low pressure limit and a relatively high pressure limit.

1 27. The molding machine of claim 26, further including a second variable trigger for
2 disengaging said ram if a measurement from said pressure measurement device exceeds said
3 relatively high pressure limit.

1 28. The molding machine of claim 26, wherein said controller contains a second variable
2 trigger for transitioning between a relatively high pressure limit and a relatively low pressure
3 limit.

1 29. The molding machine of claim 28, further including a third variable trigger for
2 disengaging said ram if a measurement from said pressure measurement device exceeds said
3 relatively low pressure limit.

1 30. The molding machine of claim 20, wherein said controller contains a variable trigger
2 for limiting the maximum extension of said ram.

1 31. The molding machine of claim 20, wherein engagement of said variable trigger
2 disengages said ram.

1 32. The molding machine of claim 18, wherein said protection system is operatively
2 coupled to said ram and controls movement of said ram.

1 33. The molding machine of claim 32, wherein said protection system extends said ram at
2 a plurality of speeds.

1 34. The molding machine of claim 33, wherein said plurality of speeds include:
2 a first speed for moving said ram from a withdrawn position; and
3 a second speed for moving said ram into a molding position.

1 35. The molding machine of claim 34, wherein said first speed is faster than said second
2 speed.

1 36. The molding machine of claim 33, wherein said plurality of speeds include:
2 a first speed of about one inch per second; and
3 a second speed of about one inch per minute.

1 37. A molding machine, comprising:
2 a heat transfer platen having a first series of channels and a second series of channels,
3 said first series of channels being separate from said second series of channels, wherein said
4 first and second series of channels are substantially coplanar within said heat transfer platen.

1 38. The molding machine of claim 37, further comprising a third series of channels
2 disposed within said heat transfer platen.

1 39. The molding machine of claim 38, wherein said molding machine is capable of
2 independently supplying a first heat transfer medium to said first series of channels, a second
3 heat transfer medium to said second series of channels, and a third heat transfer medium to
4 said third series of channels.